COMPLETION REPORT INDEPENDENT REMEDIAL ACTION BARBEE MILL SEDIMENT CLEANUP PROJECT LAKE WASHINGTON

Prepared for

Barbee Mill Company P.O. Box 359 Renton, Washington 98057

Prepared by

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and

Lloyd & Associates, Inc. 38210 5E 92rd Street Snoqualmie, Washington 98065

January 2003



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1 INTRODUCTION

This Completion Report describes the implementation of a sediment cleanup action performed by the Barbee Mill Company in summer/fall 2002 immediately offshore of the Barbee Mill facility located on Lake Washington (Figure 1). The work was conducted under the Voluntary Cleanup Program (VCP), with input from the Washington Department of Ecology ("Ecology"), and in accordance with applicable local, state, and federal permits. The objective of the remedial action was to complete cleanup of sediments offshore of the Barbee facility to achieve applicable State Model Toxics Control Act ("MTCA"; Chapter 173-340 WAC; RCW 70.105D) requirements.

The cleanup project was performed as an Independent Remedial Action under the authorities of MTCA and the Sediment Management Standards ("SMS"; Chapter 173-204 WAC). The project was also authorized under Clean Water Act Permit No. 1995-2-00997 administered by the U.S. Army Corps of Engineers ("Corps"), along with authorization from other applicable state and local agencies.

This report presents a concise narrative discussion of project implementation, and presents the results of performance monitoring confirming that the cleanup action attained site-specific cleanup standards and other performance requirements. Based on the results of the cleanup action as described herein, the Barbee Mill Company requests a No Further Action determination letter from Ecology for sediments offshore of the Barbee facility.

2 PROJECT AND PERMITTING HISTORY

The Barbec Mill Company has conducted dredging for the removal of accumulated sand and gravel in the May Creek Delta for more than 40 years, to facilitate navigation and to reduce the potential for flooding at the Barbee facility. As permitted by the Corps (e.g., Permit No. 1995-2-00997), the Company has also periodically dredged bark and sediment from areas adjacent to the facility to facilitate navigation and log handling operations.

In 1998, the Corps approved the Company's request to increase the volume of material to be dredged from areas adjacent to the facility, and specifically to address nearshore bank accumulations in these areas (Figure 1). This change was incorporated into subsequent federal, state, and local permit approvals and/or modifications, secured by the Company in early 1999 from the following agencies:

- Corps of Engineers
 - May Creek Dredging Permit
 - Bark and Wood Debris Dredging Permit
 - Coastal Zone Consistency
- Washington Department of Ecology
 - Shoreline Approval
 - Water Quality Certification/Modification.
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
- City of Renton
 - Shoreline Substantial Development Permit/Determination of Non-Significance
 - Special Permit for Grade and Fill

In summer/fall 1999, and in accordance with federal, state, and local permits, the Barbee Mill Company and its contractors dredged the May Creek Delta and a portion of accumulated bark deposits from "Area A" depicted in Figure 1. Approximately 6,000 cubic yards (cy) of bark, wood debris and associated sediment (containing greater than 50 percent wood by volume) were dredged from this area during the 1999 interim action. Manson Construction performed the dredging using a 1-cy barge-mounted clamshell bucket, and transported the materials to adjacent uplands on the Barbee facility for passive dewatering. The materials were managed in accordance with local, state and federal laws. Water quality monitoring conducted during the

2

dredging operations did not reveal any exceedance of water quality standards (Lloyd 1999). A post-construction habitat survey also documented tapid recolonization of the dredging area by aquatic plants and fisheries resources (Harza 2000).

Dredging was discontinued in late November 1999 when heavy rains and sustained poor weather conditions impeded further dewatering of the dredged material. Shortly thereafter, all work on the project was halted to provide for consultation under the 4(d) rule, to ensure compliance with the federal Endangered Species Act ("ESA").

As requested by the Corps and the federal Services (National Marine Fisheries Service and U.S. Fish and Wildlife Service), the Company submitted a Biological Evaluation/Assessment ("BE/A") in March 2000. However, compliance with ESA was not confirmed by the federal Services and the Corps until late October 2001. At that time, the Corps Permit (No. 1995-2-00997) was extended to November 25, 2002, which also modified the fish closure within Lake Washington, prohibiting dredging during the potential nearshore fish migration period from January 1 to July 15. Subsequent permit modifications allowed the Company to dredge up to an additional 20,000 cy of *in situ* sediment and wood waste from nearshore areas of the facility, in order to complete nearshore sediment cleanup within the areas depicted on Figure 1.

3 NATURE AND EXTENT OF PRIOR SEDIMENT CONTAMINATION

3.1 Initial Investigations

As part of due diligence activities conducted on behalf of JAG Corporation and Port Quendall Company, and in response to Ecology's stated concerns regarding potential wood waste impacts at the Barbee Mill and adjacent Quendall Terminals properties, in 1996 and 1997 sediment quality investigations were performed at the Barbee Mill facility as follows:

- Side-scan sonar and diver surveys to describe the distribution of wood waste debris;
- Sediment profile imaging to delineate wood waste accumulations and redox characteristics; and
- Surface sediment and core sampling, and laboratory analysis of these samples, to characterize sediment chemical concentrations.

These site characterization data, reported in ReTec (1997), were used to generally delineate the extent of wood wastes requiring cleanup, and specifically within Area A, as generally depicted in Figure 1.

As discussed above, an Interim remedial (dredging) action was performed in 1999 to remove Area A bark accumulations. Shortly thereafter, the Company performed additional sediment surveys adjacent to the facility. These sampling data revealed that wood waste materials (greater than 50 percent by volume) were present in areas immediately west of the Barbee facility (denoted Areas A, B and C in Figure 1; Lloyd 1999).

In 2000, Exponent conducted a further assessment of the deleterious properties of wood waste in the general site area by performing laboratory bioassay tests on those "gray zone" sediments at the Quendall Terminals property containing between roughly 20 and 50 percent wood waste by volume (and with no identified exceedances of other chemical criteria). The bioassay testing methods and interpretive guidelines were developed with Ecology and other stakeholders, and followed procedures previously established under the SMS for marine sediments (Exponent 2001). Sediment samples were collected from 9 locations at the Quendail Terminals property, as well as from matched reference sites, and submitted for 10-day Hyalella survival and growth tests, 10- and 21-day Chironomus survival and growth tests, and a MicrotoxTM 100 percent sediment porewater test. Three of the 9 sediment samples containing the highest concentration of wood wastes exhibited sufficient

toxicity in the 21-day *Chironomus* survival test to exceed Ecology's cleanup screening level ("CSL") guidelines. Significant sediment toxicity was not observed in any of the other samples or bioassays.

Wood wastes (predominantly relatively small sized back components) present in the Quendall Terminals sediment bioassay samples exhibited similar grain size and other characteristics as wood wastes present at the Barbee Mill facility. At both properties, the likely origin of wood wastes was from log rafting activities that occurred historically throughout the area. Because of the similarity of these wood waste materials, Ecology agreed that bioassay data obtained at the Quendall Terminals property may be used to evaluate cleanup requirements at the Barbee Mill facility (Adolphson 2002), as discussed below.

3.2 Site-Specific Sediment Cleanup Levels

In 1997, Ecology developed chemical criteria, denoted Freshwater Sediment Quality Values ("FSQV"), to predict possible biological effects in freshwater sediments resulting from chemical releases (Cubbage et al. 1997). In developing these chemical-based criteria, data from several bioassays (including Hyalella, Chironomus, and MicrotoxTM tests, among others), and corresponding chemical analyses were merged from numerous regional studies into a single database. Based on statistical analyses of these data, Ecology developed FSQVs based on a combination of marine SM5 values (metals), and probable apparent effects thresholds for MicrotoxTM (organics), which together are used as thresholds to detect potential adverse biological effects to freshwater biots.

As presented in Anchor (2002), only one chemical – total organic carbon ("TOC") – exceeded the FSQV in pre-dredging sediment samples collected from the Barbee Mill facility. Sediment TOC concentrations as high as 24 percent were detected in surface sediment samples collected by ReTec (1997), exceeding the FSQV of 14 percent. However, all sediment samples collected from the Barbee Mill property were well below sediment screening levels for polynuclear aromatic hydrocarbons and other hazardous substances. Based on these data, with the exception of wood waste and associated TOC, chemical concentrations in Barbee Mill sediments are below levels of potential sediment quality concern.

Ecology has determined that the SMS provides authority in WAC 173-204-520(5) to require cleanup of "other deleterious substances" on a case-by-case basis, in order to protect human health and the environment. The term "other deleterious substances" is defined in WAC. 173-204-200(17), and specifically includes organic debris (Kendall and Michelsen 1997).

Consistent with the Exponent (2001) bioassay results, and data from other similar wood. waste sites, the degree of adverse biological effects of wood waste in the general site area, as determined from the Quendall sediment bioassays, was correlated with sediment TOC concentrations (Anchor 2002). Ecology (Adolphson 2002) determined that TOC levels are predictive of biological effects in this application, and developed the following site-specific cleanup standards for Barbee Mill sediments:

- Total organic carbon (TOC) = 13.5 percent (dry weight basis); and
- Wood waste = 50 percent (volumetric basis).

Ecology's site-specific cleanup standards (Adolphson 2002) also included statistical compliance provisions for evaluation of post-cleanup performance monitoring data. Specifically, no single post-dredge performance monitoring sample may exceed a TOC of 16.9 percent or a wood waste level of 75 percent. Moreover, if individual sediment samples. exceed either of the two cleanup levels listed above, a statistical analysis of the data would be performed. The statistical analysis would involve calculating the 95th percentile upper confidence limit (95%UCL) of the mean concentration of samples collected within the dredge area, and comparison of the 95%LICL with cleanup levels. Consistent with SMS guidelines, sediments at the Barbee Mill site that meet these statistically-based cleanup standards would not have the potential to pose adverse biological effects on freshwater biota. The dredging boundary generally depicted on Figure 1 was developed to achieve compliance with these statistically-based cleanup standards.

3.3 Baseline Sediment Characterization

Prior to initiating dredging actions at the site, and as requested by Ecology, in early May 2002 the Barbee Mill Company performed a pre-construction baseline sediment quality survey to refine the boundaries of the remedial action area, relative to the site-specific cleanup standards discussed above. This was performed by collecting a total of 21 surface. sediment samples on approximate 125-foot centers, as generally depicted on Figure 2. As set forth in the SMS, the general point of compliance for achieving cleanup levels is the upper 10 centimeters (cm) of sediment, and baseline surface grab samples were collected from this interval. Sediment samples were collected with a 0.1-m² modified stainless steel van Veen grab sampler, consistent with current Puget Sound Estuary Program ("PSEP") protocols. The baseline sampling program is documented in Anchor (2002).

Each baseline sediment sample was visually inspected to determine the volumetric percentage of wood waste, and was also submitted for analysis of TOC and other parameters using current PSEP methods. Maximum baseline concentrations of TOC (46 percent) and wood waste (90 percent) detected at the site exceeded the site-specific cleanup action levels discussed above (Anchor 2002). Overall, 16 of the 21 baseline sediment samples collected at the site exceeded the site-specific cleanup levels for TOC and/or wood waste. Consistent with Ecology direction (Adolphson 2002), the remedial action boundary was defined by a line equidistant between those samples that exceeded the cleanup levels and those that did not. Figure 2 presents the refined cleanup action boundary.

The areal extent of the sediment cleanup area delineated in this manner was approximately 5.8 acres (Figure 2). Based on these data and other available site characterization information (e.g., ReTec 1997), up to 20,000 cy of bark, wood debris, and associated sediment within the 5.8-acre area was targeted for removal during the 2002 remedial action

4 REMEDIAL ACTION

Similar to the 1999 interim action, Manson Construction was retained in summer 2002 by the Barbee Mill Company to remove bark, wood debris, and associated sediment (up to 20,000 cy of In situ materials) from the delineated cleanup area depicted in Figures 1 and 2. Because of the correspondence between TOC and wood waste volumetric percentage at the site (Anchor 2002), Manson targeted a wood waste level of less than 50 percent in dredged materials removed from the site (i.e., in the dredge bucket) as an initial indication of when cleanup had been completed. within a given operation area. Sediment cleanup was confirmed through detailed performance monitoring, discussed below in Section 5. All materials (sediment and water) were managed in accordance with local, state and federal laws and permit requirements. Water quality monitoring was conducted during the dredging operation as specified in project permit documents, and in a manner similar to the previous 1999 monitoring (Lloyd 1999). Dredging operations and water quality monitoring results are discussed below.

Dredging Operations

Dredging operations were initiated in late July and were completed in late October 2002. Dredging of the wood waste and bark accumulation areas depicted on Figure 2 was conducted with a 1-cy barge-mounted clamshell dredge owned and operated by Manson Construction. Dredge spoils were placed in one of two scows. As one scow was being filled, the other was unloaded. In general, the clamshell dredge made two passes over the lakebed to achieve the targeted wood waste level of less than 50 percent in individual. dredge buckets/grids. Consistent with the baseline sediment sampling data, the volume of back and wood debris was highest in nearshore areas (approximately 50 to 200 feet from shoreline) and decreased with distance offshore. A total of approximately 20,000 cy of bark, wood debris, and associated sediment was removed from the site during the 2002 remedial action. Dredge production rates during the action were typically less than 500 cy/day.

Dredging of the May Creek Delta occurred concurrent with the wood waste and bark. cleanup project. Manson used a larger 5-cy clamshell dredge to accomplish dredging within the May Creek Delta.

The dredge scows were unloaded from shore with excavators and placed in an upland passive dewatering cell within the temporary dredge material storage area located on the small peninsula between Area A and May Creek (Figure 1). Once the materials (sand/gravel or bark/wood debris) were sufficiently dewatered for handling, the dredge spoils were excavated and trucked further from the shoreline (within the Barbee facility property). Passive dewatering within the temporary dredge storage area achieved handling specifications, although fine sediment accumulation on the bottom occasionally impeded infiltration. Periodic excavation of fine materials on the bottom of the dredge storage area served to restore adequate rates of infiltration for dewatering. Characterization of the dredged materials for potential beneficial reuse is discussed below in Section 6.

4.2 Water Quality Performance Monitoring

Throughout the dredging operations, a silt curtain was placed in the water along the entire dredge boundary generally depicted on Figure 1. Filter fabric was hung on log booms interlinked with existing piling to provide a secure silt fence. The curtain was weighted so that it rested on the bottom of the lakebed.

Water quality monitoring was performed at regular intervals (11 sampling events) during the remedial action to ensure water quality protection in the area during the conduct of the action. Water quality measurements were routinely collected at three stations located outside of the silt curtain within or near May Creek (Stations 1 through 3), and at four stations inside the silt curtain approximately 30 to 50 feet from the working dredge or unloading operations (Stations 4 through 7; Table 1). These measurements included middepth determinations of temperature, dissolved oxygen, conductance, and turbidity. Water quality monitoring data collected during the 2002 action are summarized in Table 1.

Similar to conditions reported in 1999 (Lloyd 1999), at no time during the 2002 dredging operations was water quality degraded within the silt curtain to below applicable state water quality standards (Chapter 173-201A WAC). Relatively little turbidity was detected during the dredging operations, and was highly localized and transient. Turbidity was maintained below state standards and rarely exceeded May Creek background levels (Table 1). Similarly, no significant oxygen depletion was observed, and dissolved oxygen levels were maintained above applicable lake water quality standards (greater than 8 mg/L dissolved oxygen), even adjacent to the clamshell dredge during dredging operations. No fish distress was observed during the dredging operations.

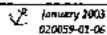


Table 1
Water Quality Performance Monitoring Clate Summery - 2002

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Special Communication Communication (Communication Communication Communi	Bank Arman Bank Arman	17	1.61	374 185
SURE - Promise and				77.2
States 2 - Variety Gagge	Bath Arms A Bath, Miles	112	1,49 1,60	18.6
Statum 3 - SW Point* Statum 4 - Bettern Double-Arrent A)	Bade Army I. Bade Arms A	E.S	7.13 7.55	71.5 20.2
SUSONS - WIND DOOR (AME C)	Barn weeks	67		702
Successi - Access Creane area Nacces 7 - Score Debassing Area	Quantity a Cash Arma A	94	526	70.7
\$12 111				
Science 1 - Property Proper 34864 2 - White Badge*	Ban Area A Bank Area A	100	1,Na 7,N3	163
Supply 3 Sm Poet	Bet 4mm4	# 4	3.10	198
Sizza 4 - Beza, Deck (kree 4) Sizza 5 - Witer Cost (Ama C)	Gyrt Ange Mark Aray	45 27	1.90	21 d 22.0
Suppose - Action Orange Area Streets 7 - Serie Liene and Area	Cart Avea	• • • •	4.10	21.0
\$27.99	Date With 1	40	340	320
Super 1 - Prominer Bridge' Super 2 - Princip Bagge'	Bitte draw B. Base Army O	10.4 #2	121 1.80	13.6 13.6
Station 3 - SPF Point*	Safe Arms &	4.5	207	21.4
Suspensi - Basan Data (Avez 4) Shakan 3 - Wayer Dock (Avez C)	Ban web 2 Bat Arm 6	43	1,60 2,67	31,4 21,4
Statem 4 - Active Credge Area	Carb Arms &	7.	4.70	315
SURGO 7 - Stem (Interior of Artist (INTERIOR)	Ben was	75	141	hs
Blabor I - Padaritim Bridge*	Rash, Arma, B	184	1.12	26.7
Summit - Wilhelm Bridge" Summit - 200 Pour	BoA Arra B BoA Arra B	4.7	1 15 1.19	17,1 181
States 4 - Been Bock (Arg. A)	Ban Army &	4.7	1.1#	13:5
Support - Mateur Cross (Avec Cr) Support - Appen Crossing Avec	Back Armella Back Armella	8.5	1.19 1.15	20.5 20.5
Sharen F - Serse damparting drap	Base Army &	40	114	194
Sumon 1 · Processor Brager	544 444 B		1,12	30.7
Starr, 2 · Varies Dage,	Bee free	17	1.10	17 1
Statum 3 - Beam Deck (Frank 1)	Bade Army de Dami Arms F	70	1.14	187 275
Sheem 5 - Wage Copt (4444 C) Stitten 4 - Active Drudge Area	Gan Aven b Bade Aven b	40	1,0 4 1,63	906 C46
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94 hop Slater I - Padacitan Briger	Back Arms B.	4.7	1.24	207
Suppose to the suppose of the suppos	Bath Armst	4.4	1.24	17,1
Succes 3 - State Popular States 4 - Boson Docto (Arms A)	Gan Area de Baste Areas de	4.5	129	18T 295
\$4000 - Wash Code (mass Co	D84	11	1.25	496
Statem 4 - Acting Creeding Area Statem 1 - Store Unitedians Area	Dark Arms &	90	1.44 125	20.9 19.5
17191				
States 1 - Partegripe Begge* States 2 - Value Bestge*	Quality b Bade Arms b	42 9.7	1 IQ I.M	180 130
Supply : Sam Provide	Both from I	90	1.33	164
Shoon 4 - Bean Bean (Aree A) Slater 5 - Water Cock (Assa C)	Ban Arms &	4.7 4.7	1 M 1.24	198
Sunce 6 - Notice Drame Area States 7 - Street Basense Area	SM, Wash	83	510	14.0
17140	D4	g,	134	4.
Super I - Peasertin bridge Super 2 - Valuge Basse*	Bard, Arma B Raja, Arap S	#.P	121	U
Slater-3 - SPI Point*	Bed Arms &	4.6	129	M 1
Затал а - Варт руду (а _{тарт} а) Summ S - Wang Dops (Анда С)	Both tropped GUIN NOOPE	87	159 1,81	17.1 12.D
Statute 6 - Archae Cresspe Area	Back Arms &	47	300	184
SURGO F - Score (Introduction Areas HOLD COM	550,4465	E.0	188	18.4
Statute 1 - Particulation Design*	Bark Area C	104	1.17	117
Suson 2 - vamoe Baeye* Shaar 3 - Sife Powe*	BAN AVAIC BAN AVAIC	154	1.11	19.T 13.8
States 4 - Books Garde (Area A)	Boots Area C	0 +	113	FFF
GMAP 6 - PARTIN DOZE (Avec C) Second 6 - Actual Dispage Juga	Bart Area C	E#	141 271	135
Supple 1 - Book Orbertony Arms (0.0000)	Bet Arm C	14	181	V5 :
34644 1 - Pédarrien Iridge'	May Cream Days	180	1.15	40
Sinten 3 - 2/4 Sons, Sunder 5 - Adunte Budde.	May Creek Deals May Creek Deals	18.6 1.6	1.15 1,54	10.1 14.2
Supple 4 - Beam Book (Arms A)	May Creek Dake	■ 6	1.46	163
School S - Warps Ones (Aves Co Slabor 9 - Action Droubs Area	Ang Creek Data May Creek Data	98	1.35 1.86	14 I 150
Shore 7- Son- wereney Area	Ump Creek Care	ii .	#13	14.2

5 SEDIMENT QUALITY PERFORMANCE MONITORING

As discussed above, Manson targeted a wood waste level of less than 50 percent in dredged materials removed from the site as an initial indication of when cleanup had been completed within a given operation area. Shortly after this initial performance standard was achieved throughout Area A (mid August) and Areas B/C (late October), sediment quality performance monitoring was conducted to verify that the site-specific sediment cleanup levels discussed in Section 3.2 had been achieved. All performance monitoring was performed by Anchor Environmental, LLC ("Anchor") following Ecology-approved procedures (Adolphson 2002, Anchor 2002).

Performance monitoring involved sampling all 16 baseline stations that previously exceeded site-specific cleanup levels for TOC and/or wood waste (Anchor 2002), along with two additional stations (BMPD-22 and BMPD-23) located immediately offshore of the dredge area. Sediment could not be recovered from the most inshore sampling station (BMPD-17; located immediately adjacent to shoreline structures), even after repeated attempts in the general sampling area. Thus, a total of 17 post-dredge confirmation samples were collected on approximate 125-foot centers, as depicted on Figure 2. Surface sediment samples (0 to 10 cm) representative of the final dredged surface were collected with a 0.1-m² modified stainless steel van Veen grab sampler, consistent with the baseline sampling program and current PSEP protocols.

Each post-dredge performance monitoring sediment sample was visually inspected to determine the volumetric percentage of wood waste, and was also submitted to Analytical Resources, Inc. (Seattle, WA) for analysis of TOC and other parameters using current PSEP methods. Performance monitoring data are summarized in Table 2; field logs and laboratory certificates are provided in Appendix A.

Data received from the analytical laboratory were reviewed for accuracy, precision, and compliance with overall quality assurance objectives. Field replicates and laboratory duplicates were collected and analyzed, and were within acceptable limits. The laboratory analyzed matrix spike and matrix spike duplicates, which were also within acceptable quality criteria.

Maximum post-dredge concentrations of TOC (13 percent) and wood waste (35 percent). detected at the site were well below the site-specific cleanup action levels (Yable 2). Thus, detailed statistical analyses were not needed, as described in Section 3.2 above. The postdredge sediment quality performance monitoring clearly verified that the dredging action. achieved site-specific sediment cleanup levels throughout the 5.8-acre action area. Based on this analysis, and consistent with Ecology direction, no further sediment remedial action is required at the Barbee Mill facility (i.e., sediment cleanup was successful).

Table 2 Summary of Post-Dredge Performance Monitoring Results

	Wash, State P	ane NAD 27 N.			Water		Sam/606		[
Station ID	Northing	Easting	Oate Sampled	Time Sempled	Depth (ft)	Penetration Depth (cm)	interval (cm)	TOG (%)	Volume Wood (%)
		up Standard (av	erace conc	entration)				13.5	50
Maximum Al	owable Concer	testion	<u> </u>	I	l			15 9	75
BNAPD-1	196,841.12	1,681,739,14	10/29/02	1100	18.0	17	0-10	B.3	- 55
BMPD-2	198,641.12	1,861.264.14	10/29/02	1520	18.9	15	0-10	130	35
BMPD-6	196,591.12	1,651,139,14	10/26/02	1133	18.2	17	0.10	58	
BMPD-7	196,591 12	1,661,264.14	10/29/02	1200	127	19	0-10	- نو په - ۱	10
PMPD-9	196,466 12	1,651,139 14	10/29/02	1245	14.5	- 78	Q -10	5.7	10
BMPD-10	195.465 12	<u>1,561,284.14</u>	_10/29/02	1300	12.5	17	0-10	. 64	<u> 10</u>
BMPC-11	195.341 12	1,681.014.14	10/29/02	1345	19.1	19	- 6-10 -	35	5.7
BM62D-12	196,3 41 12	1,651,139 14	10/29/02	1355	14.0	17	Q-1 0	50	. 25
BMPD-13	198,341 12	1,661,264 14	10.53103	. 1414	72.3	18	0-10	73	25
SMPO-13R ^b .	195,341.12	1,681,264,14	. 10/29/02	1430	12.1	. 17	Q-1B	6.8	Z5
BMPD-14	195,216 12	1.661,014 14	102902	145D	18.8	<u>- 19</u> i	0-10	6.0	一
BMPD-15	298,25B 12	1,661,139 14	8/21/02	1100	NA.	33	[0-10]	1-55-	<5
BMP9-16	196,216.12	1,661,254.14	8/21/02	1110	NA	15	0-10	2.3	<5
BMPC-17	196,216 12	1.561.389.14	8/21/02	NA.	NA	. 0	D	N/A	NA NA
SMPTJ-19	166,091.12	1,661,139,14	8/21/02	1250	NA.	15	Q-10	62	₹5
BMPC-20	198,093.32	1,861 376 16	B/21/02	1255	NA	13	Q-1B	77	15
BMP0-21	195,985,12	1,561,389.14	8/21/02	1135	NA	16	0-16	4.1	< 5
BMPD-22	196,341 12	1,660,889,14	10138005	133D	220	17	Q-1D	7.3	25
9M₽Q-23	198,218.12	1,650,689 14	10/29/02	1440	22.8	16 -	9-10	5.6	~3·

^{* -} Volumetric wood percentage based on visual contention following homogenization of the Lucyon 10 cm of the surface sample

Fleet quarry assurance sample: Sample collection in recedum collection to Anation 10 (i.e., region) prompts.

^{1 -} Sample could not be collected over to insufficient sportment representation the secretar blowing several attempts.

6 DISPOSAL AND BENEFICIAL REUSE OF DREDGED SEDIMENTS.

As discussed in Section 4.1 above, approximately 20,000 cy of sediments dredged during the 2002 remedial action were transported to adjacent uplands for passive dewatering. Once the materials (sand/gravel or bark/wood debris) were sufficiently dewatered for handling, the dredge spoils were excavated and trucked from the shoreline to upland stockpile areas on the Barbee facility property. The sediment stockpiling area also included approximately 6,000 cy of materials from the previous 1999 interim remedial action (Lloyd 1999). Characterization of all dredged materials (approximately 26,000 cy total) for disposal or potential beneficial reuse is discussed below.

6.1 Stockpile Tracking, Sampling, and Analysis Methods

Previous sampling of the initial (1999) 6,000 cy bark/sediment stockpile indicated that the concentrations of total carcinogenic polynuclear aromatic hydrocarbons ("CPAHs") within this interim remedial action stockpile were likely below the MTCA unrestricted land use criterion of 0.14 milligrams per kilogram (mg/kg; dry weight basis; Lloyd 1999). However, due to CPAH detection limit and sample variability issues, the previous data did not support a definitive comparison with this MTCA criterion. All other chemical constituents, including metals, total petroleum hydrocarbons (NWTPH-Dx), and other semivolatile organics in the dredged and/or stockpiled materials were below cleanup levels for unrestricted use of the material (ReTec 1997, Lloyd 1999, Anchor 2002).

In order to characterize current CPAH concentrations within the interim remedial action (1999) stockpile, incorporating anticipated biodegradation of CPAHs within the stored bark/sediment stockpile over the 1999 to 2002 period, Barbee Mill resampled the interim remedial action sediment stockpile during summer 2002, and used the results to verify suitability of these 6,000 cy of material for disposal and/or beneficial reuse. An equivalent sampling methodology was also used to characterize the 20,000 cy of sediments dredged during the 2002 remedial action. The overall stockpile sampling methodology, as approved by Ecology (Sato 2002), consisted of the following:

 As discussed above, dredged materials were initially transferred from a scow to the temporary nearshore dewatering/storage area. As soon as dredged materials were sufficiently dewatered, they were sampled and then moved to the upland stockpile area. The origin and location of each stockpile was recorded on a site map.

- Stockpiles were segregated during cleanup operations to prevent mixing. In addition, sands and gravels from the May Creek Delta were moved to the facility parking lot, while bark and wood debris were staged adjacent to the chip bunker behind straw bales until analytical data were available.
- Composite samples of each stockpile were prepared from equal volumes of material obtained from 10 to 20 representative vertical sections advanced either by hand with a clean shovel, or with an excavator (for larger stockpiles), at randomly selected locations within each stockpile. Each vertical section was sampled throughout the depth of the bark/sediment, and material collected from the surface to the bottom of the stockpile. Occasionally, composite samples of dredged materials were collected directly as the dredge scows were unloaded.
- Two (2) representative samples were collected and analyzed from the 6,000 cy interim remedial action (1999) stockpile (5amples BA-14 and BA-15, plus replicates). Chemical analyses of stockpiles generated by the 2002 remedial action dredging occurred at a frequency of approximately 1 analysis for every 500 to 1,000 cy of material, or 24 analyses for 20,000 cy of material (5amples BA-16 through BA-40). Thus, a total of 26 chemical determinations (plus replicates) of stockpiled materials were performed during summer/fall 2002.
- Each composite sample was mixed thoroughly prior to sub-sampling for chemical analysis. The samples were analyzed for CPAHs using low detection limit single ion monitoring ("SIM") analysis by Analytical Resources, Inc (Seattle, WA). Data received from the analytical laboratory were reviewed for accuracy, precision, and compliance with overall quality assurance objectives. Field replicates and laboratory duplicates were collected and analyzed, and were within acceptable limits.
 Duplicate and replicate data (when available) were averaged to characterize overall chemical quality of individual stockpiles. The laboratory analyzed matrix spike and matrix spike duplicates, which were also within acceptable quality criteria.
- The analytical results for CPAHs were evaluated using the toxicity equivalent concentration ("TEC") procedure as generally described in Ecology's MTCA/CLARC Publication 94-145 (updated November 2001). If the total TEC concentration for CPAHs in the composite soil sample was below 0.14 mg/kg, the material within that stockpile was deemed suitable for unrestricted beneficial reuse at on- or off-site locations. Conversely, stockpiles exceeding the 0.14 mg/kg criterion will disposed or

treated at an approved off-site landfill facility. As discussed below, stockpiles of materials that exceeded 0.14 mg/kg were segregated from materials with CPAH concentrations less than this beneficial reuse criterion.

Sediment Stockpile Characterization Data

Barbee Mill sediment stockpile characterization data collected during 2002 are presented in Tables 3 and 4. The results of these determinations are summarized as follows:

- All 7 composite samples collected in 2002 of material dredged from Area A (see Figure 1), including the 6,000 cy interim remedial action (1999) stockpile, met the unrestricted beneficial reuse criterion (Table 3). As discussed by Lloyd (1999), a relatively small volume of sediments dredged in 1999 immediately adjacent to the shoreline oil/water separator (Sample BA-13), which contained elevated concentrations of motor oils and/or hydraulic oils, was previously segregated from the rest of the Area A material, transported to an approved off-site facility, and incinerated. Thus, all current Area A stockpiles at the Barbee Mill facility are suitable for unrestricted beneficial reuse at on- or off-site locations.
- Four (4) of the 15 composite samples collected in 2002 from material dredged from Area B exceeded the 0.14 mg/kg criterion for CPAHs (Table 4). The other 11 samples met the unrestricted beneficial reuse criterion (Table 3). Thus, approximately 73 percent of the Area B volume is suitable for unrestricted beneficial reuse at on- or off-site locations.
- Three (3) of the 4 composite samples collected in 2002 from material dredged from Area C exceeded the 0.14 mg/kg criterion for CPAHs (Table 4). The fourth sample met the unrestricted beneficial reuse criterion (Table 3). Thus, approximately 25 percent of the Area C volume is suitable for unrestricted beneficial reuse at on- or off-site locations.

Sediment samples that contained elevated cPAH concentrations (above 0.14 mg/kg) also exhibited visible burnt wood embers and chips. These observations, as well as the observed (pre-cleanup) pattern of elevated CPAH concentrations in areas closest to the former sawmill (i.e., Area C), suggest that the source of cPAH compounds detected in these sediments is likely attributable to an historical fire that occurred during the mid 1950's, which destroyed much of the former sawmill.

6.3 Final Disposition of Stockpiled Materials

As discussed above, dredging for the removal of bark and wood debris at the Barbee Mill facility was successfully completed in late October 2002. Sampling and analysis data indicates that the majority of the stockpiled sediments from this action (sand/gravel and bank/wood debris) are substantially below MTCA Method B criteria for unrestricted beneficial reuse at on- or off-site locations. Sediments that are suitable for unrestricted beneficial reuse (approximately 18,000 cy total, including 1999 interim action material; Table are currently stored in a secure upland location at the facility, pending final disposition. (sale, transfer off-site, or reuse on-site).

Sediments exceeding the MTCA Method B CPAH criterion for unrestricted beneficial reuse (approximately 8,000 cy total; Table 4) were initially stockpiled in a separate and secure upland location at the facility. All of these materials are currently being transferred to the Olympic View Sanitary Landfill in Kitsap County, Washington.

Based on the results of the cleanup action as described herein, the Barbee Mill Company requests a No Further Action determination letter from Ecology for sediments offshore of the Barbee facility.

Table 3

Barbee Mill Sediment Stockpile Data: 2002 Characterization

Parameter (mg/kg dry wt)	BieiP Eq. Factors	BA-14	(m QAP +q.)	BA-15	(ma BAP eq.)	BA-15-1 (Lab Dup.)	(se GAP es.)	BA-15-2 (Field Rep.)	(se EAP aga)	BA-16	(10 BAP eq.)
PAH's by Single Ion Monitoring (SIM)	Bark Area A	\								
Naphthalene		0.046		0.029 U		0.007 J		0.012		0 008 U	- .
2-Methylnaphthalene		0.033		0.029 U		0.007 J		0.009	'	U 8040.0	
Acenaphthylene	[0.034 U		0.029 U		0.010 U		0.006 J		0.008 U	
Acenaphthene	'	0.080	• • •	0 029 U	••	0.012		0.016	•	0.007 MJ	
Fluorene		0.096		0.086		0.010		0.016		0.007 MJ	
Phenanthrene		0.320		0.092		0.051		0.092		0.029	
Anthracens		0.063		0.038		0.017		0.016		0.00B MJ	••
Fluoranthene		0.280 M	u _	0.490		0.092		0.018	-,	Q.D57 M	
Pyrene		0.240 M		0.370		0.05B		0.110		อ 018 M	
Benzo(a)anthracene**	0.10	0.076 M	0.QB\$ M	0.160	0.016	0.037	0.004	0.036	0.004	0.023 M	0.002 M
Chrysene**	0.01	0.096 M	0.001 M	0.190	0.002	0.066	0.001	0.060	0.001	0018M	0.000 M
Benzo(b)fluoranthene**	0.10	0.160 M	0.016 M	0.140	0.014	0.093	0.009	0.061	0.00B	0 015 M	0 002 M
Benzo(k)filuoranthene**	0.10	0.110 #	0.011 M	0 1 1 0	0.011	0.079	0.008	0.044	0 004	D.D12 M	0.001 M
Benzo(a)pyrene (B[a]P)**	1.00	0.080	0.080	0.092	0.092	0.069	0.069	0.050	0.050	0 D12 M	0.012 M
Indeno(1,2,3-cd)pyrene**	0.10	0.060	0.006	0.064	0.006	0.00B J	0.001 J	0.020	0.002 J	0.8000	0.001
Dibenz(a,h)anthracene™	0.40	0.020 MJ	0.008 MJ	0 023 J	0.009 J	0 010 B	0.002 V	U 800.0	0 DO3 J	บ 800.0	0.002 U
Benzo(g,h,i)perylene		0.070 M	(0.072		0.010		0.025	}	M 800.0	
Dibenzofuran	[<u></u>	0.050		0.028 U		0.010 U		0.010		0.00 8 U	
Total cPAH (Mathod B = 0.14 r	ng/kg)		0.130	••	0.161	• •	0.093	••	0.070		0.020
Total Organic Carbon (% of dry	M)	7.3	[4.4		٠-		5.5		34	
Total Solids (% of wet wt)		58.7		67.0				78.8		83.0	

M - Poor apectral match

J = estimated quantity below PQL

D = delution

0.130 Total CPAH concentration (as B[a]P equivalent) is below MTCA Method 8 unrestricted beneficial reuse criterion
 0.151 Exceedance of MTCA Method 8 unrestricted beneficial reuse criterion not confirmed in sample duplicates/replicates
 All material stockpies represented by these data are suitable for unrestricted beneficial reuse (see text).

Table 3

Barbee Mill Sediment Stockpile Data: 2002 Characterization

					,						•
Parameter (mg/kg dry wt)	B(a)P Eq. Factors	BA-17	(as 849 aq)	BA-18	(40 PAP +4.)	BA-19	(m 842 m)	BA-20	(es BAP eq.)	88-21	(as BAP eq.)
PAH's by Single Ion Manitoring (SIM)	Bark Area /							•	Bark Area E	3
Naphthalene		0.009 U		0.012 U		0 Q05 J		0.009 U		0.008 J	
2-Methylnaphthalene		0 009 U		0.012 U		0.010 U		U: 80Q.0		0.B11 U	
Acenaphthylene		0 009 U	٠- :	0.012 U	•	0.010 U		0.009 J		0.0 1 1 U	
Acenaphthene		0.011	'	0.014 M		0.010 U		0.012		0.009 J	• •
Fluorens		0.008 J		0 0 1 2		Q.007 J]	0.015		0.006 J	
Phenanthrene		0.049		0.049		0.045	'	0 091		0.035	
Anthracene		0.011		0.011 J		0.008 J	'	0 024		O.DOB J	
Fluoranthene		0.096 :		0.074		0.071		0.140 .		0.037	
Pyrene		0.068		0.049		0.057	[0.086		0.034	
Benzo(a)anthracene**	0.10	0.022	0.002	0.026	0.003	0.026	0.003	0.035	0.004	0.019	0.002
Chrysene**	0.01	0.032	0.000	Q.05B	0.001	0.037	0.000	0.120	0.001	0.032	0.000
Berzo(b)iluoranthène**	0.10	0.038	0.004	0.053	0.005	0.040	0.004	0.054	0,005	0.034	0.003
Benzo(k)fłuoranthene**	0.10	0.027	0.003	0.036	0.004	0.029	0.003	0.055	0.006	0.025	0 003
Benzo(a)pyrena (8(a)P)**	1.00	Q.02B	0.028	0,041	0.041	0.034	0.034	0.045	0.045	0.031	0.031
Indeno(1,2,3-cd)pyrene**	0.10	0.006 J	0 001 J	0.016	0.002	0.012	0.001	0 012	0.001	0.029	0.003
Dibenz(a,h)anthracene**	0.40	0.009 U	0.002 U	0.012 U	0.002 U	0.010 U I	0.002 U (0 009 U	0.002 U	0.00B J	0.003
Benzo(g,h,i)perylene		0.0086 J		0.02 M		0.013		0.016		0.014	
Dibenzofuran	- <u>-</u>	0 0056 J		0.0 06 J		0.010 U		0.009 ()	<u> </u>	0.011 U	
Total cPAH (Method B = 0.14 m	ig/kg)		0.039	-	0.867	4-	0.047	••	0.064		0.045
Total Organic Carbon (% of dry v	vt)	3.8		4.4	**	5.5		3.5		26	· · · ·
Total Solids (% of wet wt)	· <u> </u>	72.5		53.1		67.7		81.8		62.7	

M ~ Poor spectral match

O.039 Total CPAH concentration (as B|a)P equivalent) is below MTCA Method 8 unrestricted beneficial reuse criterion.

All material stockpiles represented by these data are suitable for unrestricted beneficial reuse (see text).

d = estimated quantity below PQL

D = dilution

Table 3
Barbee MIII Sediment Stockpile Data: 2002 Characterization

Parameter (mg/kg dry wt)	BjajP Eq. Factors	88-23	Jan Bar eq.)	BB-24	[mi BAP eq.]	BB-26	(sa BAP eq.)	BB-26-1 (Resample	of BB-2B)	BB-27	(aç EAP eq.)
PAH's by Single Ion Monitoring (SIM)	Bark Area I	9								
Naphthalene	[0.079		0.020		0.020		0.009 U		0.010 U	:
2-Methylnaphthalene	!	0.018		0.010 U		0.009 U		0.009 U		Q.Q1D U	
Acenaphthylene		0.009 U		0.010 U		0.009		0.009 0	-,	0.010 0	
Acenaphthene		0.013		0.010		0.009		0.009 U		ป 010.0	
Fluorene		0.007 J		0.010 U		0.009		0.009 t/		0 .010 b	
Phenanthrene		0.023		D.044		0.068		0.034		0.017	.,
Antivacene		D.009 U		0.012		0.013		0.005 J		0.010 6	
Fluorantisene		0 022		0.054	• •	0.067		0.040	٠.	0.031	
Pyrene		0.022		0.04B		0.059		0.046		0.036	• /
Benzo(a)anthracene**	0.10	0.062	0.006	0.030	0 003	0.036	0.004	0.020	0.002	0.026	0.003
Chrysene**	0.01	0.031	0.000	0.070	0 001	0.063	0.001	0.044	0.000	0.031	0 000
Benzo(b)fluoranthene**	0.10	0.044	0.004	0.097	QQta	0.100	0.010	0.061	0.008	0.045	0.005
Benzo(k)fluorenthene**	0.10	0 028	0.003	0.068	0.007	0.096	0.010	0.042	0.004	0.038	0.004
Berzo(a)pyrene (B[a P)**	1.00	0.031	0.031	0 091	0.091	0.092	0.092	0.050	0.050	0.040	0.040
Indeno(1,2,3-cd)pyrene**	0.10	0.026	0.003	0.059	0.006	0.065	0.007	0.034	0.003	0.024	0.002
D/benz(a,h)enthracene**	0.40	0,009	0.004	0.022	0.009	0 020	0.008	U 800.0	0.0 0 3 J	0.010 U	0.002 U
Benzo(g,h.i)perylene		0.031		0.068		0.086		0.046		0.029	
Dibenzofuran	<u> </u>	0.006 J		0 <u>.0</u> 10 U	,.	0.009 U		D.009 U		O.010 U	
Total cPAH (Method B = 0.14 m	ng/kg)		0.051	:	0.126	••	0.130	••	0.069		0.056
Total Organic Carbon (% of dry v	vt)	3.5		3.5		3.1		3.0		2.7	•••
Total Solids (% of wet wt)		70.0		67.0		77.4		74.0		67.8	

M = Poor apactral match

0.061

Total CPAH concentration (as B[a]P equivalent) is below MTCA Method B unrestricted beneficial reuse criterion.

All material stockpiles represented by these data are suitable for unrestricted beneficial reuse (see text).

Jile estimated quantity below PQL

D < d/ution

Table 3

Barbee Mill Sediment Stockpile Data: 2002 Characterization

Parameter (mg/kg dry wt)	B(s)P Eq. Factors	88-28	(to 5AP pg.)	96-29	(m BAF eq.)	88-31	(so CAP eq.)	88-33	(4 = MAP =4,)	88-35	(M. BAF eq.)
PAH's by Single Ion Monitoring (SIM)	Berk Area B	3								
Naphthalene		0 010 U	٠	0.009 U		0.010 U	٦- '	0.010 U		0.010 U	
2-Methylnaphthalene		0.010 U		0.009 U		0.010 U		0.010 U		0.010 U	
Acenaphthylene		0.Q10 U		0 0009 U	٠	0.010 B		0.010 U		0.010 U	
Acenaphthene		0 010 U	٠.	0 0009 U	·	Q.018 U	• •	0.Q10 U		0.010 U	
Fluorene		0.01 0 U		0.009 U	• • •	0.010 U		0.010 U		0 0 1 0 U	
Phenanthrene		0.012		0.036		0.010		0.022		0,027	
Anthracene		ט סרס.ם	'	0 0009 U		U D10.0		0.010 U		0.010	
Fluorenthene		0.019	'	0.049		0.020		0.037		0.039	
Pyrene		0.026	'	0.050		0.020	'	0.046		0.046	• •
Benzo(a)anthracene**	0.10	0.020	0.002	D 03D	0.003	0.015	0.002	0.030	0.003	0 025	0.003
Chrysene**	0.01	0.062	0.001	0.062	0.001	0.027	0.000	0.070	0.001	0.054	0.001
Benzo(b)/livoranthene**	0.10	0.097	0.010	0.084	0.00B	0.048	0.005	0.083	0.008	0.071	0 007
Banzo(k)fluoranthane**	0.10	0.060	0.006	0.081	800.0	0.026	0.083	0.073	0.007	0.046	0.005
Benzo(a)pyrene (B[a]P) [→]	1.00	0.092	0 092	0.078	0.078	0.037	0.037	0.087	0.087	0.057	0.057
Indeno(1,2,3-cd)pyrene**	0.10	0.076	0.008	0.058	0.006	0.026	0.003	0.061	0.006	0 029	0.003
Dibenz(a,h)anthracene**	0.40	0.021	0.008	0,014	0.006	Q.010	0.004	0.023	0.009	0.010	0.004
Benzo(g,h,i)perylene		0,110		0.076		0.039		0.091		0.034	
Dibenzofuran		0.010 U		0.009 0		0 010 U		0.010 U		0 010 U	·
Total cPAH (Method B = 0.14 m	ng/kg)		D.126		0.110		0.053	- 4	0.122		0.079
Total Organic Carbon (% of dry v	wi)	4.5	••	2.6		1.6		2.6		3.6	
Total Solids (% of wet wt)		60.6	••	74.6		63.5	•	63 3	<u> </u>	67.3	

M = Poor spectral match

J = estimated quantity below PQL

D - dikillan

Total CPAH concentration (as B[a]P equivalent) is below MTCA Method 8 unrestricted beneficial reuse criterion.

All material stockpiles represented by those data are suitable for unrestricted beneficial reuse (see text).

Table 3
Barbee Mill Sediment Stockpile Data: 2002 Characterization

Parameter (mg/kg dry wt)	BjalP Eq. Fectors	88-38	M BAT #4	BC-38	(on SAP exp
PAH's by Single Ion Monitoring (SIM)	Berk Area l	∃	Bark Area (··· –
Naphthelene		0.013 U		0.010 U	
2-Methytnaphthalene		0.013 0	•	0 010 U	• -
Acenaphthylene		0.013 0		0.010 U	
Aconaphthene	l	0.019		0.010 U	
Fluorene	ì	0.013 U		0 010 U	
Phenanthrene	i	0.075	•	0 024	
Anthracene		0.030		0.010 U	
Fluoranthene		0.082		0.036	
Pyrene	-,	0.078	- <i>-</i> -	0.036	
Benzo(a)anthracene**	Ď. 10	0.033	0.003	0.026	0.003
Chrysene**	0.01	0.058	0.001	0.070	0.001
Benzo(b)(luoranthene**	0.10	0.047	0.005	0.110	0.011
Benzo(k)fluoranthene**	D.10	0.035	0.004	0.058	0.006
Benzo(a)pyrene (B[a]P)**	1 00	0.046	0.046	0.080	0.080
Indeno(1,2,3-cd)pyrene**	0.10	0.023	0.002	0.053	0.005
Dibenz(a,h)anthracene**	0.40	0.013 U	0.003 U	0.024	0.010
Benzo(g,h.i)perylene		0.029		0.078	
Dibenzofuran		0.013 U		0.010 0	
Total cPAH (Method B = 0.14 m	ig/kg)		0.053		0.115
Total Organic Carbon (% of dry v	vt)	4.0	•	3.0	
Total Solids (% of wet wt)		49.3		62.5	••

M = Peor spectral match

J = estimated quantity below PQL

D = dllubon

O.063 Total CPAH concentration (es B[a]P equivalent) is below MTCA Method B unrestricted beneficial reuse criterion.

All material stockpiles represented by these data are suitable for wivestricted beneficial reuse (see lext).

Table 4 Barbee Sediment Offsite Disposal Samples

Parameter (mg/kg dry wt)	BjøjP Eq. Factors	BB-22	(as BAP eq.)	BB-25 (Resample	of B8-22)	BB-30	(= EA7 sq.)	88-32	4	8 8-34	jas 64P aq.)
PAH's by Svigle Ion Monitoring (Berk Area			··-		Boo sq;		(m BAP eq.)		HE BHY 443
Naphthalene		0 024	7.	0.028		0.047 U		0 011 U	.,	0 0 12 U	
2-Methylnaphthalene	l . .	0.009 J		0.011 2		0.047 U		0.011 U	}	0.012 U	
Acenaphthylene		0.009 J		0.013		0.047 U	·	0.011 U		0.012 U	
Acenaphthène		0.016		0.013	'	0 047		0,011 1/		0. 0 21 U	
Fluorene		0.016		0.011 U	'	0 170	-,	0.011 0	,,	0.012 U	
Phenanthrene	٠	0.088		0.067	:	0.270		0.052	٠,,	0.021	;
Anthracene		0.021		0.020	'	0.970		0.015		0.012	'
Fluoranihene		0.130		0.100		0 240		0.086		0.043	'
Pyrene		0.100		0.096		0 280		0.066		0.049	
Benzo(a)anthracene⁼*	0.10	0.063	0.006	0.049	0.005	0.150	0.015	0.042	0.004	0.054	0.005
Chrysene**	0.01	0.120	0 001	0.100	0.001	0.460	0.005	0.099	0.001	0.140	0.001
Benzo(b)fluoranthene**	0.10	0.300	0 030	0.160	0.016	0 200	0.020	0.140	0.014	0.230	0.023
Benzo(k)fluoranthène**	0.10	0 220	0.022	0.120	0,012	0.150	0.015	0.110	0.011	0.120	0.012
Benzo(a}pyrene (B[a]P)↔	1.00	0 170	0 170	0.140	0 140	0 180	0.180	0.140	0.140	0.230	0.230
Indeno(1.2,3-cd)pyrane**	0.1D	0.140	0.014	0.047	0.005	0.110	0.011	0.091	0.009	0.130	0.013
Dibanz(a,h)anthracene**	0.40	0.044	0.018	0 014	0.006	0 047 U	0.009 U	0.034	0.014	0.049	0.020
Benzo(g,h,i)perylene	- -	0.170		0.061	• •	0.130		0.120		0.210	
Dibenzofuran		0.00B J		0.011 U		0.047 8		0.011 น		0.012 U	
Total cPAH (Method B = 0.14 m	1 <u>g/kg)</u>		: 0206 €		00 <u>100</u> 0	·- ·	0.295°		75 GS07.00		0200
Total Organic Carbon (% of dry v	vt)	4.9		4.5	· ··.	2.5		2.7		1.8	
Total Solids (% of wet wt)		51.3		60.6		70.9		631		64 1	

M = Poor spectral majch

Exceedance of MTCA Method B unrestricted beneficial reuse criterion indicated by sampling data Materials transported to Olympic Wew Sanilary Landfill in Kileap County, Washington

Jile ealimated quantity below PQL

D - dibition

Table 4
Barbee Sediment Offsite Disposal Samples

Parameter (mg/kg dry wt)	BjajP Eq. Factors	BB-37	(at 880° eq.)	BC-39	(La DAF és, j	BC-40	(es BAP sq.)
PAH's by Single Ion Monitoring (SIM)	Bark Area (,
Naphthalene		0 0 1 1		0.011 0		0 020	
2-Methylnephthalene	٠.	0.011 U		0.011 U	٠. ا	0.028	i
Acenaphthylene		0.025		O.011 U		0.016	
AcenaphiAene		0.028		Q.011 U		0.032	;
Fluárene		0.034		0.011 0	/-	0 029	
Phenaryhrene		0.280		0.044		0 180	
Anthracene		0.078		0.017		0.065	
Fluoranthene		0.330		0.074		0.230	'
Pyrene	•	0.220		0.068		0.180	'
Benzo(a)anthracene**	0.10	0.110	0.011	0.052	0.005	0.130	0.013
Chrysene**	0.01	0.200	0.002	0.110	0.001	0.260	0.003
Benzo(b)fluoranthene**	0 10	0.240	0 024	0.180	0.018	0.380	0.038
Benzo(k)fluoranthene**	0.10	0.210	0.021	0.120	0.012	0 240	0.024
Benzo(a)pyłene (B(a)P)**	1.00	0.280	0.280	0.150	0.150	0.390	D 390 ,
Indeno(1,2,3-cd)pyrene**	0 10	0 120	0 012	0.098	0.010	0 170	0.017
Dibenz(a.h)anthrecene"	0.40	0.056	0.022	0.044	0.018	0.081	0.032
Benzo(g,h,i)perylene		0.160		0.140]	0.190	
Dibenzofuran		0.014	,.	0.011 0	v-	0 020	
Total cPAH (Method B = 0.14 n	• •	0.50%		1 0.20 0 og		10.877	
Total Organic Carbon (% of dry v	vl)	4.3		2.9		3.3	
Total Solids (% of well wt)		56.5		60 1		53.6	

M = Poor speciral match

J = estimated quantity below POL

 $\mathbf{p} = \mathbf{p} \cdot \mathbf{p}$

B.202,

Exceedance of MTCA Method B unrestricted beneficial reuse criterion indicated by sampting data

Materials transported to Olympic View Sanitary Landfill in Kilsap County, Washington

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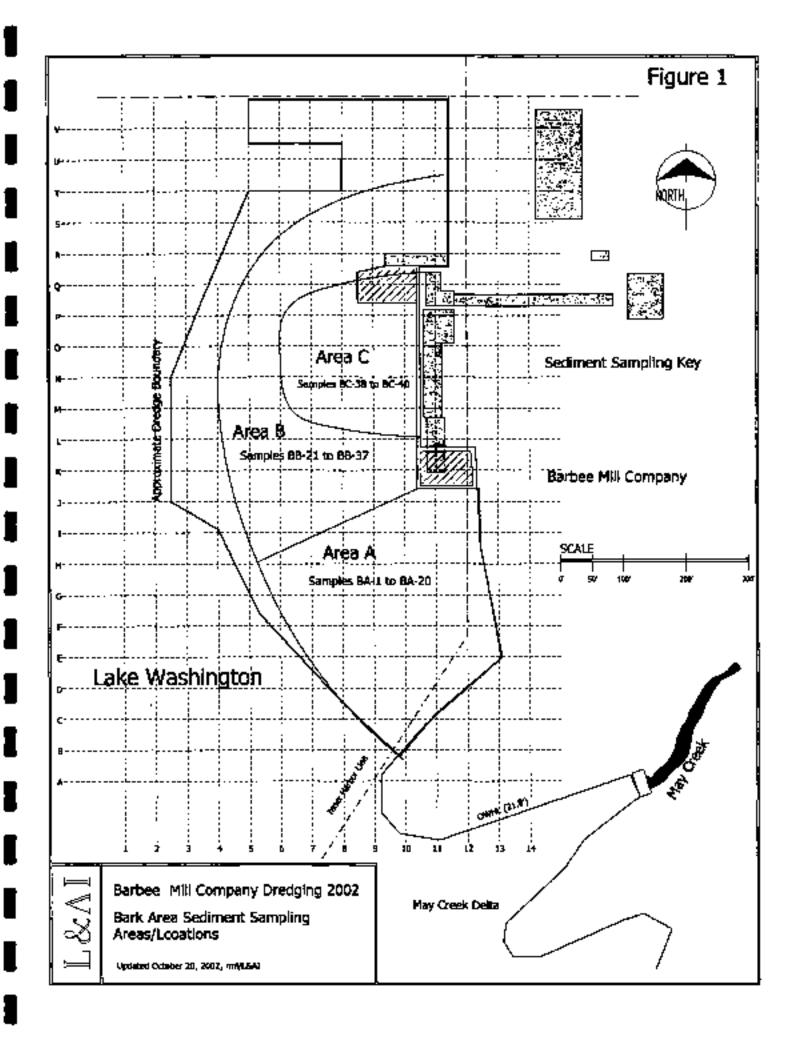
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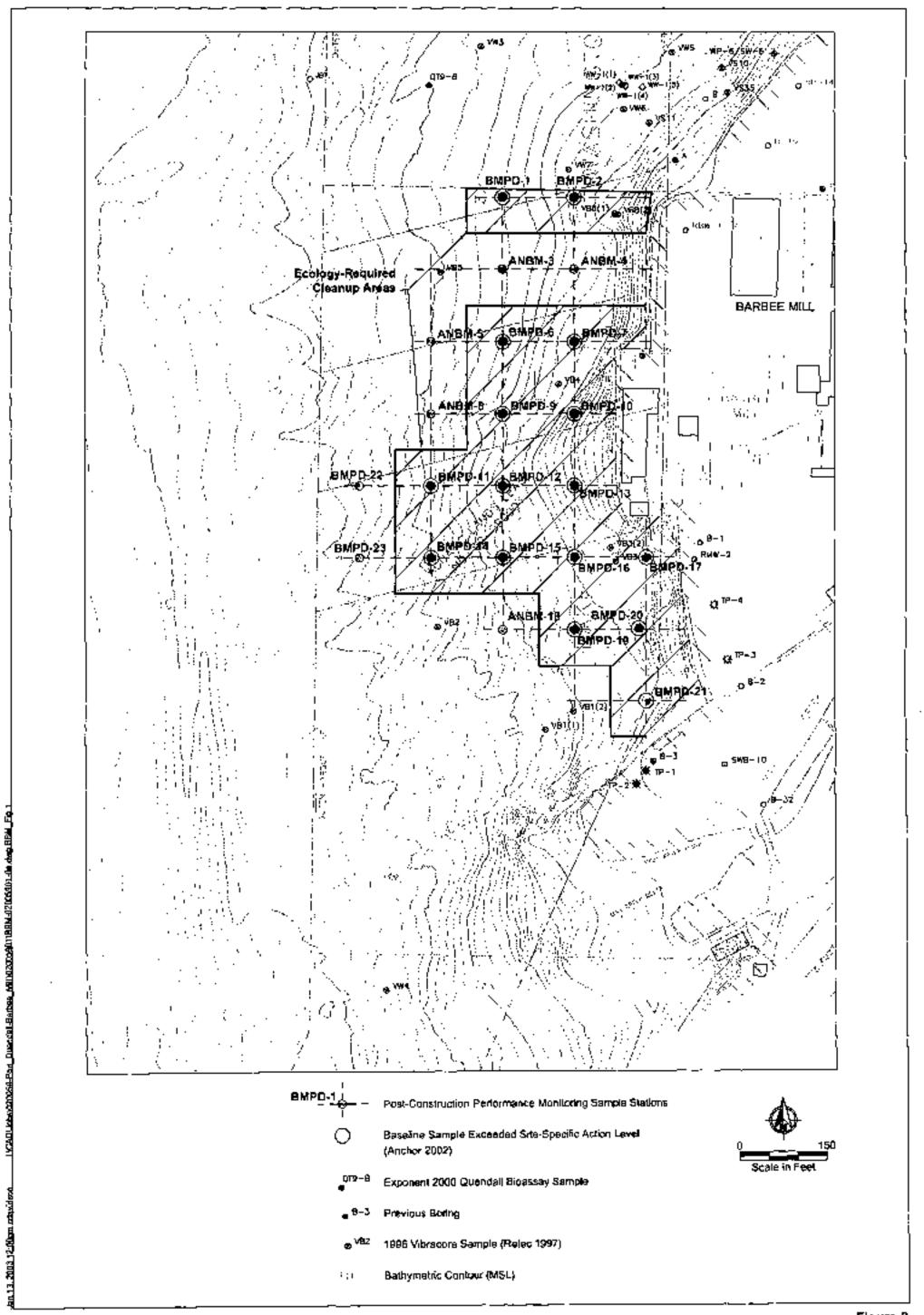
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APPENDIX A FIELD LOGS AND LABORATORY CERTIFICATES **POST-DREDGE MONITORING**

Collection Date: 8/21/02 Shipping Date: 8/21/02

roject Name: Belite	ldb Pro	ject No: 0200 51-0]	-	Station ID: BMPD- K
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Recorded by: Kyan Buth 8/21/62

Collection Date: 10 21 02 Shipping Date: 10 25 02

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Collection Date: 10 20 20 Shipping Date:

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Recorded by:	yan Burth					

Collection Date: 10/89/42 Shipping Date: 10/28/02

Project Name: Buller Mulla 020059-01 T3 Station D: BMPD-06 Project No: Sampling Crew: Sampling Method: ver Vera Sampling Vessel: Subcontractor(s): Station Coordinates: N / Lat. Weather E/W/Long. Zone Datum: NAD 83 (WGS 84) Sample Number: BMPD-06 Analysis: Metals / BNAs / VOCs / PCBs / Peat / Herb / TBTs / Diox-Furans (TS) Grain Size / TS / Ammonia / Sulfides (Circle Appropriate Analyses) Pielo Test Results Солупения: Salinity: Ammonia: Grain Sizex rri Coarse: mi Fines: Water Capth: 12.2 Penetration/Sampled Depth: Real Grab Mumber: _ Bloassay / Chemistry AVS/SEM; Total Suffices; VOC Sample (orcie) Sediment Color: Sediment Odor: Sediment Type: D.O. 448 125 cobbis. الكل الكلا الكلا الكلا الكلا OTBY archt Patrofeum black moderate other. Бъсту strong DICAMP. overwhelming. wanic metter brown surface Water Cepth:_ Penetration/Sampled Depth: Grab Number. _ AVS/SEM; Total Sulfides; VOC Sample (circle) Bicassay / Cherekty (drde) Sediment Color: Sediment Type: Sediment Odoc Community: D.O. 12010 H28 cobbia 0.87 alloht Peeroteum black Approx C M F moderate other: strang. ailt clay **DEPART** brown surface gymenetral ming organic matter Water Depth; Penetration/Sampted Depth: Grab Number: AVS/SEM: Total Sulfides; VCC Sample (circle) Broassay / Chamietry (circle) Sediment Type: Sediment Color: Sediment Odor: Солотиле 0.0. H25 cabble OCC18 OF STATE **PER** elight. Petroleum sand CM F black mand arrarla: eli day рити aprona organic marter brown audice overwhelming Grati Number Water Death:__ Penetration/Sampled Depth: AVS/SEM: Total Sufficient VOC Sample (climin) Bicassay / Chemistry (dice) Sediment Type: Sediment Coxic Sediment Odor: Comments; gobble D.O. H2S ga avel Meile CHAY Potroleum sand CMF Neck MIDGB(RISE ganer: etil ciay brown والماشو public matter brown Surface **CANADAMINA**

Recorded by:

Collection Date: Polarios Shapping Date: 10/28/02

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Recorded by:

Collection Date: to 25/02.
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Collection Date: 10/29/02 Shipping Date: 10/29/02

Project Name: Paulie	M.LLa Project N	02-051-0	t	Station ID:	BHPD-1
Sampling Crew 7.	Barth, E. Parken				
Sampling Vessel:	<u> </u>	Sampling Method:	Vin	Vecn	
Subcontractor(s);	10				
Station Coordinates: N / Lat.		Westier.		· •	
E/W/G	ong.	•			
Datum: NAD 83	WGS 84 Zone	<u> </u>			
Sample Number: 341	PD-10				
	BNAs / VQCs / PCBs / Peet / Hert	7797s / Dlox-Fursive			
(T S1 }Gre	n State / TOC / TVS / Ammoring / S	5 ulfidea			
{Girde A	ograpriete Arustystasi				
Field Teet Requite	<u> </u>	Comments:			
Sailnily:	pigat				
Ammonto:	mort.				
Gram Size:	mi Coarse:	mi Finas:		· 	
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Graph Number: 1	Waren 125		102 L	. . .	1Enc
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Sediment Type:	Bediment Calor:	Sedment Odor:		Comments:	. 0
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sand CMF 1272	bac <u>a</u>	moderate	other:	• • • • • • • • • • • • • • • • • • •	•
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organic reaser	brown surface	overwhelming 1	tinglest	[
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áin clay	Town)	strong]	
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Oraved	ф. а.у	\$b Gmt	Petroleum		
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	black	in code and		1	
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Collection Date: 10/24/02 Shipping Date:

Sampling Vessel: Subcontractor(s): Sagfoot Coordinates: N/ Let. E / W / Long. Obtum: NAD 63 / WGS 84 Zone: Sample Number: Metally f NNAS / VCC3 / PCBs / Pest / Herb / TBTs / Olox-Furants (Circle Appropriate Analyses) Flaid Teel Results: Commenta: Salinity: Anthonia: Grain Size: Water Depth: H. Penetration/Sampled Depth: Record Number: Water Depth: H. Penetration/Sampled Depth: Record Number: Sediment Type: Sediment Type: Sediment Color: Sediment Color: Convenients: Sediment Type: Sediment Type: Sediment Type: Sediment Color: Sediment Color: Sediment Color: Convenients: Sediment Color: Sediment C	<u>ts</u>
Sampling Vessel: Subcontractor(s): Station Coordinates: N / Let E / W / Long. Ostum: NAD 63 / W65 94 Zone: Sample Number: Analysis: Mytalg / BNAs / VCCs / PCBs / Pest / Henr / TBTs / Clox-Furains TS / Strain Size / TOC / VS / Ammunia / Sutfides (Circle Appropriate Analyses) Fleid Teal Results: Salinity: Anmonia: Grain Size: Writer Depth: Writer Depth: Writer Depth: Dioassaya Chemistry AVS/SEM; Total Sutfides: VOC Sample (circle) Sediment Type: Sediment Color: Sediment Color: Sediment Color: Cobble gravet sand C M F sit day organic matter Water Depth: Dioassaya Chemistry Sediment Color: Sediment Color: Sediment Color: Sediment Color: Cobble gravet sand C M F sit day organic matter Water Depth: Water Depth: Dioassaya Chemistry Sediment Color: Sediment Color: Cobble gravet sand C M F sit day organic matter Water Depth: Dioassaya Chemistry Sediment Color: Cobble gravet sand C M F sit day organic matter Water Depth: Dioassaya Chemistry Sediment Color: Cobble gravet sand C M F sit day organic matter Water Depth: Dioassaya Chemistry Sediment Color: Convenents: Comments: C	<u>ts</u>
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E / W / Long. Detum: NAD 63 / WGS \$4 Zone:	<u>ts</u>
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Sample Number:	ξς
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Circle Appropriate Analyses Comments	<u>ts</u>
Climbe Appropriate Analyses Fleid Teal Results	<u>ts</u>
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Salinity: ppt Annonia: mg/L Grain Size: m4 Coarse: mi Fines:	ųs
Ammonia:	<u>ts</u>
Grain Size: m# Coarse; mil Fines:	42
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sand C M F sift day brown surface offer strong overwhelming Grate Number:	
silt day strong crostree metter P.S. brown surface strong overwhelming Grate Number: Page 1 - Page 1	
Cross Number:	^r 1
Grate Number: Benetution/Sampled Oppth; Time:	
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ells clay brown aurong	
programs matter brown surface proventerming	

Collection Date: |0/25/02 Shipping Date:

Project Name: Bay	a Hills		o) <u>T3</u>	Station ID: BHPD-1
Sampling Crew:	R.Buth. E.	Parkey		
Sampling Vessel:		Bampling Ma	ethod: Law V	421
Subcontractor(s):		_		
Station Coordinates: N	rtat.	VMs	Mer:	
	(W/Lorg.	_	_	
_	AD 93 / WGS 84	Zone:		
Sample Number.	BMFD-12	·	-	-
		s / Pest / Herb / TBT's / Diox-Fur?		
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ıç	Circle Appropriate Analyses)			<u> </u>
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Sa≅nty:		ppl	والم والمستول	interest statement.
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diseases Committee to	drolle) AVS/(SEM; Total S	ulfides; VOC Sample (circle)		I
Sadiment Type:	Sediment Color:	Sediment Odor:		Comments:
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	8-x	ad print	Pşimleum	minus (mariel)
BOOCHE Stattegraph	" \ bi≥ <u>r*</u>	moderalis	other:	
p © ctay	/ (666 66)	srong	مصاء بزغ	
xganic metter	Druwn surface	overwhelming		
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eand CLMT	black	moderate	other:	
selt ctay	риоми	gtrong		
organic matter	brown syrtace	covered elements		
	Sum B1			

Collection Date: |- 25/02 Shipping Date: |- 25/02

	,bee	Mel	Project No:	0.00.037 - 0	21	Station ID:	Pr(PO- (
Sampling Crew:	12:1	etth, E.P.	les.			·-	BHPD-
Sampling Vessel:				Sampling Nethod	: نجم '	Vern	
Subconnector(x):		- 10					
Station Coordinates:				Weather	70444	<u>ut :</u>	
	E/W/Lo	na.				-	
Detum:	NAD 837		Zone			•	
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		NAs / VOCs / PCBs					
	_	SEE 1/100 TVS /	Ammona / Sulfi	des.			
	Circle Ap	propriete Analyses)	_				
Field Teal Pesuits				Comments	سامه ۲	ita (combo	iata)
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irab Number: 1				etion/Sempled Depth	: 8cm 14) Time:_	1472
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	t, re	O.O. gray black) sig			25 % 2	سيا طرارية مو
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Recorded by: Ryan Batth

Collection Date: co/29/03 Shipping Date: co/29/03

Project Name: 🛚 🖳	ba 1	llo	Project No	· 02cm31	01 73	Station ID: BHPD-14
Sampling Green	· 12:	Berth E	Parker			
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Subcontractorial		- 10	_			
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	E1W/La	TUE:			<u></u>	
Datum:	NAO 837		Zone:			
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Cciay		TOWN D	Į.	этонд	Rashen	10
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Blosssay / Chemistry	(cercie)	AVS/SEM; Total				
Sedument Type:	ica car	Sediment Color:		Sediment Oder:		Community.
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igravel		gray	<b>~</b> 4	54971	Petroleum	
BAND CMF		black	I	moderate	other:	
salt clay		Drown	I	Sireng		i
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KINGSHIL HARLES		DIOWI BUIROC	<del></del>	arti arisarreg	<del>,</del> -	
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Biomssay / Chemistry	(CEC -	AVS/SEM; Total	CHARLES VICES	emple (circle)		
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Collection Date: 10/29/02 Shipping Date: 10/29/02

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Collection Date: 10/25/02 Shipping Date: 10/25/02

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organic matter  Grad Number  Bloessay / Chemistry  Sediment Type: cubble graved sand C M F		branch  brown surface  Water Depth:  AVS/SEM; Total:  Sediment Color:  D.O.  9799  black	Pen Suifides; VOC S	strong overwhelming etration/Sampled Depth Sample (circle) Seciment Odor: none slight moderate	Shakk Shan H25	Time:	and)
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Grade Number	(circle)	Drown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown surface  Vater Depth: AVS/SEM; Total brown surface  Vupetr Depth: AV6/SEM; Total	Pen Sufficies; VOC S	strong overwhelming etration/Sampled Depth Sample (circle) Sectionant Odor: none slight moderate overwhelming etration/Sampled Depth Sectionary Cidor: nose shigh moderate strong overwhelming	H25 Petroloum other: H25 Petroleum other.	Commonts:	wind)
Grate Number  Grate Number  Blosessy / Chambery  Sediment Type: cobide graved sand C M F got clay organic matter  Grate Number: Bioassay / Chemistry  Sediment Type: cobols gravel aand C M F sit clay organic matter  Grate Number:	(circle)	Drawn surface  Water Depth:  AVSISEM; Total  Sediment Color:  D.O.  9799  black brown surface  Water Depth:  AVSISEM; Total  Sediment Color:  D.O.  9799  black brown surface  Vapatr Depth:  Water Depth:  AVSISEM; Total  Sediment Color:  D.O.  9799  black brown brown surface	Pen Sufficies; VOC S	strong overwhelming etration/Sampled Depth Sample (circle) Sectionant Odor: none slight moderate overwhelming etration/Sampled Depth Sectionary Cidor: nose shigh moderate strong overwhelming	H25 Petroleum other: H25 Petroleum other:	Commonts:	and)
Grab Number  Grab Number  Stockery / Chemistry  Sediment Type: cubile graves sand C M F grat clay organic matter  Grab Number: Bioassay / Chemistry  Sediment Type: cubols graves  sand C M F still clay organic matter  Grab Number:  Grab Number:  Grab Number:	(circle)	Drown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown surface  Vater Depth: AVS/SEM; Total brown surface  Vupetr Depth: AV6/SEM; Total	Pen Sufficies; VOC S	strong everwhelming everwhelming everwhelming Sample (circle) Sediment Oxfor: none slight moderate everwhelming erration/Sampled Depth Sedimens Oxfor: none slight moderate everwhelming everwhelming everwhelming everwhelming everwhelming everwhelming	H25 Petroloum other: H25 Petroleum other.	Commons:  Time:  Commons:  Time:	and)
Grab Number: Blossessy / Chambatry Sediment Type: cubble graves sand C M F goz etay organic matter  Blossessy / Chambary Sediment Type: cubble gravel sand C M F stil day organic matter  Grab Number: Blossessy / Chambary Sediment Type: cubble gravel sand C M F stil day organic matter  Grab Number: Blossessy / Chambary Sediment Type:	(circle)	branch Drown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown brown surface  Water Depth: AVS/SEM; Total Sediment Color: D.O. gray black brown brown surface  Vupetr Depth: AVS/SEM; Total Sediment Color: Sediment Color:	Pen Sufficies; VOC S	strong everwhelming everwhelming everwhelming sample (circle) Sectionant Odor: none slight moderate everwhelming everwhelming sample (circle) Sectionary Odor: none steph moderate strong overwhelming everwhelming strong overwhelming	H25 Petroleum other: H25 Petroleum other:	Commons:  Time:  Commons:  Time:	wind)
Grab Number: Blossessy / Chambetry Sediment Type: Cabble gravel sand C M F got etay organic matter  Grab Number: Blossesy / Chambery Sediment Type: cabble gravel sand C M F sel day organic matter  Grab Number: Blossesy / Chambery Sediment Type: cabble Grab Number: Blossesy / Chambery Sediment Type: Cabble Grab Number: Blossesy / Chambery Sediment Type: Cabble	(circle)	Drown surface  Water Depth:  AVS/SEM; Total: Sediment Color: D.O.  9799 black brown brown surface  Water Depth:  AVS/SEM: Total Sediment Color: D.O.  9799 black brown brown surface  Vupatr Depth: AVS/SEM: Total Sediment Color: O.O.	Pen Sufficies; VOC S	strong everwhelming everwhelming everwhelming Sampte (carde) Sectionant Odor: none slight moderate everwhelming errettory/Sampted Depth Sectionary Clear none strong dynamic (circle) Sectionary everwhelming everwhelming strong dynamic (circle) Sampte (circle) Sampte (circle) Sampte (circle) Sampte (circle)	H25 Petroloum other: H25 Petroloum other:	Commons:  Time:  Commons:  Time:	wind)
Grade Number  Grade Number  Bloacesty / Chambatry  Sediment Type: cubble gravel sand C M F goz etay organic matter  Grade Number: Bloacesty / Chambatry  Sediment Type: cubble gravel sand C M F still day organic matter  Grade Number: Bloacesty / Chambatry  Sediment Type: cubble gravel Sediment Type: cubble gravel Sediment Type: cubble gravel	(circle)	Drown surface  Water Depth:  AVS/SEM; Total: Sediment Color: D.O.  9799 black brown brown surface  Water Depth:  AVS/SEM; Total: Sediment Color: D.O.  9799 black brown brown surface  Vupatr Depth: AV5/SEM; Total: Sediment Color: O.O.  9789	Pen Suifidnes; VOC S	strong overwhelming etration/Sampled Depth Sample (circle) Sectionant Odor: none slight moderate overwhelming etration/Sampled Depth Sectionary Clear available (circle) Sectionary Clear available (circle) Sectionary Clear available (circle) Sectionary Clear available (circle) Sectionary Clear sectionary Clear available (circle) Sectionary Clear available (circle)	H2S Petroleum other:  H2S Petroleum other:	Commons:  Time:  Commons:  Time:	wind)

Recorded by: Bath



5 November 2002

Ryan Barth Anchor Environmental, L.L.C. 1411 4th Avenue Suite 1210 Seattle, WA 98101

RE: Client Project: Barbee Mills

ARI Job No: EX78

#### Dear Ryan:

Please find enclosed the original Chain-of-Custody record and the final analytical results for the sample from the project referenced above. Thirteen sediment samples were received on October 29, 2002. The samples were analyzed for total solids and total organic carbon as requested.

There were no problems associated with these analyses.

A copy of these results will be kept on file. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
<mark@arliabs.com>

**Enclosures** 

cc: file EX78

MDH/ej

6 + 76

## Chain of Custody Record & Laboratory Analysis Request



Analytical Resources, Incorporated Analytical Chemists and Consultants 4611 South 134th Place, Suite 100 Tukwila WA 98168 206-695-6200 206-695-6201 (fax.)

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Counts of Unitary. Analytical financies, Inc. (Affil will perform at requested services in accordance with appropriate methodicitys hydrox Affi Standard Operating Procedures and Quality Associated Program. This program meals stractions for the request. The countries of Affil is officers, operate, employees, or successors, artising out of or in connection with the requested services. Aftil not connect the weeken amounts. The exceptance by the chang of a propagal for services of Affil reference Affil from any delitity in excess charged, nor withoutputing any provision to the continue of any contract, perchase order or consigned agreement between Affil and the chair.

Problemagn have if you would the thous samples disposed of other explication of standard archive times (60 days for waters 90 days for each, strainments per contract). If you do not ment these camples oncorded we will begin thinging you for storage after the disposal date.

Samples to be depended after explication:



### QA Report - Method Blank Analysis

GC Report No: EX78-Anchor Environmental

Macrix: Sediment Project: Barbee Mill

Date Received: NA

Data Release Authorized: BA

Reported: 11/04/02

## NETWOO BLANK RESULTS CONVENTIONALS

Analysis Dote & Betch	Comatituest	Onits	Rémult
Hethod Blank 10/29/02 10292#1	Total Solids	mg residue	√ 0.01 t
Nothod Blank 11/04/02 11042#1	Total Organic Carbon	Percent	< 0.005 0



### Leboratory Analysis of Conventional Parameters

Sample Mo: BMD93-01

Lab Sample ID: EX78A

QC Report No: EX78-Anchor Environmental

LIMS ID: 02-16022

Project: Barbee Mill

Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized:

Date Received: 10/29/02

Reported: 11/04/02

	inalysis		Dilution			
Analyce	Date/Batch	Method	Factor	11	Daice	Result
Total Solids	10/25/02 10292#1	EPA 160.3 EM 2540 B		0.01	Percent	38.7
Total Organic Carbon	11/04/02 11012W1	Plumb, 1981		0.0650	Percent	6.3

RL Analytical reporting limit

U Undetected at reported detection limit

B Abalyte found in method blank above detection



#### Laboratory Analysis of Conventional Parameters

Sample No: BMPD-06

Lab Sample ID: EX79E

QC Report No: EX78-Anchor Environmental

LIMS ID: 02-16023

Project: Barbee Mill

Macrix: Sediment

Date Sampled: 10/29/02

Data Release Authorized: 🚧

Date Received: 10/29/02

Reported: 11/04/02

Amelyte	Analysia Date/Batch	Hethod	Dilution Pactor	RZ.	Units	Zesult
Total Solids	10/29/02 10292#1	BPA 160.3 SM 2540 B		0.01	Percent	41.5
Total Organic Carbon	11/04/02 1104 <b>2#</b> 1	Plymb, 1981		0.0050	Percent	5,8

RL Analytical reporting limit

U Underected at reported detection limit

B Analyte found in method blank above detection



#### Final Report Laboratory Analysis of Conventional Parameters

#### Sample No: BMPD-07

Lab Sample ID: EX78C

QC Report No: EX78-Anchor Environmental

LIMS ID: 02-16024

Project: Barbes Will

Macrix: Sediment

***********

Data Release Authorized:

Date Sampled: 10/28/02 flate Received: 10/29/02

Reported: 11/04/02

	Analysia		Dilution			
Analyte	Date/Batch	Wethod	Factor	RL	Onite	Regu <u>lt</u>
Total Solids	10/29/02 1029201	EPA 160.3 SK 2540 B		0.01	Percent	33.1
Total Organic Carbon	11/04/02 11042#1	P) ymlo, 1981		a.005a	Percent	4.9

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



#### Minel Report

### Laboratory Analysis of Conventional Parameters

#### Sample No. IMPD-09

tab Sample ID: EX78D

QC Report No: EX78-Anchor Environmental

Project: Barbee Mill

LIMS ID: 02-16025 Matrix: Sediment

Date Sampled: 10/29/02

Data Release Authorized: Date Received: 10/29/02

Reported: 11/04/02

Analyte	Analysis Date/Batch	Method	Dilution Factor	HI.	Unite	Result
Total Solids	10/29/02 10292#1	EPA 160.3 9M 2540 B		0.01	Percent	37.1
Total Organic Carbon	11/04/02 11042#1	Plumb, 1981		0.0050	Percent	5.7

RLAnalytical reporting limit

П Undetected at reported detection limit

Analyte found in method blank above detection



Laboratory Analysis of Conventional Parameters

#### Sample No: RMPD-10

Lab Sample ID: EX76E

OC Report Mo: EX78-Anchor Environmental

Project: Barbee Will

LINS ID: 02-16026 Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized:

Date Received: 10/29/02

Reported: 11/04/02

Analyte	Annlysia Date/Batch	Mechod	Dilation Factor	RI	Unite	Result
Total Solids	10/29/02 1029241	EPA 160.3 SM 2540 B		0.01	Percent	33.7
Total Organic Carbon	11/04/02 11042#1	Plumb, 1981		0.0050	Percent	6.4

RL Analytical reporting limit

V Undetected at reported detection limit

B Analyte found in method blank above detection



#### Laboratory Analysis of Conventional Parameters

Sample No: BMPD-11

Lab Sample ID: EX78P

QC Report No: EX78-Anchor Environmental

LIMS ID: 02-16027

Project: Barbee Mill

Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized: 🚧

Date Received: 10/29/02

Reported: 11/04/02

	Analysis		Dilucion			
Analyte	Date/Batch	Method	Factor	ЯL	Units	<b>App</b> ult
Total Solids	10/29/02 1029201	EPA 160.3 9M 2540 B		0.01	Percent	67.5
Total Organic Carbon	11/04/02 11042#1	Plumb, 1981		0.0050	Percent	3.5

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



### Laboratory Analysis of Conventional Parameters

Sample No: BMDD-12

Lab Sample ID: EX78G

QC Report No: EX78-Anchor Environmental

Project: Barbee Mill

LIMS ID: 02-16028 Matrix: Sediment

Date 9ampled: 10/28/02

Data Release Authorized: 🎢

Date Received: 10/29/02

Reported: 11/04/02

	Analysia		Dilucian			
Apalyte	Date/Batch	Hethod	Factor	RL	Units	<u> Peşult</u>
Total Solids	10/29/02 10292#1	EPA 160.) SM 2540 B		0.01	Percent	43.1
Total Organic Carbon	11/04/02 11042#1	Plumb, 1981		a.ads0	Percent	5.0

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



#### Laboratory Analysis of Conventional Parameters

Sample No: 2820-11

Lab Sample ID: EX78N

DC Report No: EX78-Anchor Environmental

Project: Barbes Will

LIMS ID: 02-16029 Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized: 00-0

Date Received: 10/29/02

Reported: 11/04/02

	Analysis	Analysis Dilut:					
Analyte	Date/Batch	Sethod	Factor	RL .	Quit.	Result	
Total Solide	10/29/02 10392 <b>4</b> 1	EPA 160.3 SM 2540 B		0.01	Percent	38.7	
Total Organic Carbon	13/04/02 11042#1	Plumb, 1981		0.0050	Percent	7.3	

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



### Laboratory Analysis of Conventional Parameters

Sample No: 2007D-132

Lab Sample ID: EX76I

OC Report No: EX76-Anchor Environmental

LIMS ID: 02-16000

Project: Barbee Mill

Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized:

Date Received: 10/29/02

Reported: 11/04/02

	Analysis	Dilution				
Analyte	Date/Batch	Kethod	Factor	RI	Onite	Result
Total Solids	10/29/02	EPA 160.3		0.01	Percent	36.3
	10292#1	SM 2540 B				
Total Organic Carbon	11/04/02	Plumb, 1981		0.0050	Percent	6 . B
	11043#1					

RL Analytical reporting limit

V Undetected at reported detection limit

B Analyte found in method blank above detection



#### Final Report Laboratory Analysis of Conventional Farameters

Sample No: BMPD-14

Lab Sample 3D; EX78J

QC Report No: EX78-Anchor Environmental

Project: Barbes Mill

LIMS TD: 02-16031 Matrix: Sediment

Data Release Authorized: Ren

Date Sampled: 10/28/02 Date Received: 10/29/02

Reported: 21/04/82

	Apalysis		Dilution			Result
Anglyce	Dute/Satch	Hetbod	Pactor	RL .	Omite	
Total Solida	10/29/02	EPA 160.3		0.01	Percent	25.7
	1029241	SM 2540 B				
Total Organic Carbon	11/04/02 11042#1	⊉lumb.198I		D. 0050	Percent	6.0

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



#### Final Amport Laboratory Apalymia of Conventional Parameters

Bample No: BOFD-15-88

Lab Sample ID: ERNA

CC Report No: ER11-Anchor Environmental

LINGS ID: 02-11408

Project: BARRE WILLS

Ratrix: Sediment

Whatcom Waterway Sediments

Data Release Authorized:

Date Sampled: 09/21/02

se Authorized: 047 Date Received: 00/22/02

Reported: 08/29/02 Ady S. Phillips

<u>Amelyte</u>	Analysis Date/Satch	zethod	Dilution Factor	NL.	Caita	Result
Total Solide	08/26/02 0826281	EPA 160.3 EN 2540 B		0.01	Percent	49.3
Total Organic Carbon	08/27/02 0827201	Plumb,1981		0.0050	Percent	5.5

RL Analytical reporting limit

U Undetected at reported detection limit

h Analyte found in method blank above detection

Report for BR31 received 00/22/02



#### Final Report Laboratory Analysis of Conventional Parameters

Sample Mo: HMWD-15-88

Lab Sample III: ERSIB

QC Report No: ER31-Anchor Environmental

LIMS ID: 02-11409

Project: BARBER MILLS

Macrix: Sediment

Whatcom Waterway Sediments

Data Release Authorized:

Date Sampled: 09/21/03

Date Received: 09/22/02

Reported: 08/29/02 Amy 8. Phillips

Analyte	Analysis Date/Satch	Kethod	Dilution Factor	RL_	Voite	Bosult
Total Solids	08/26/02 08262 <b>f</b> 1	EPA 160.3 EM 2540 B		0.01	Percent	62.1
Total Organic Carbon	08/27/02 08272 <b>#</b> 1	Plumb, 1981		0.0050	Percent	2.3

ПĻ Analytical reporting limit

D Undetected at reported detection limit

Analyte found in wethod blank above detection

Report for BR31 received 09/22/02



#### Final Report Laboratory Analysis of Conventional Parameters

#### Exemple No: MIPD-15-88

Lab Sample ID: ER)1C

OC Report No: ER31-Anchor Environmental

LINS ID: 02-11410

Project: BARBER MILLS

Matrix: Sediment

Mhatcom Waterway Sodiments

Data Release Authorized: 0.4

Date Sampled: 08/21/02

Date Received: 08/32/02

Reported: 08/29/02 Awy 8. Phillips

Analyte	Raplysis Rata/Ratch	<u> Esthod</u>	Dilution Feator	<u>ы</u>	Daits	Sesult
Total Solids	08/25/02 08262 <b>6</b> 1	EPA 160.3 SM 2540 B		0.01	Percent	30.1
Total Organic Carbon	08/27/Q2 08272 <b>#</b> 1	Plumb, 1981		<b>Q</b> .0050	Percent	6.2

Mr. Analytical reporting limit

U Undet444ed at reported detection limit

B Analyte Found in method blank above detection

Report for ER31 received 00/22/02



Laboratory Amplysis of Conventional Parameters

Sample Fo: EMPD-20-88

Lab Sample ID: ER31D

QC Report No. EE31-Anchor Environmental

LIMS ID: 02-11411

Project: BARBER MILLS

Matrix: Bediment

Whatcom Waterway Sediments

Data Release Authorized: OF Data Received: 08/22/02

Reported: 08/29/02 Amy 8. Phillips

Amalyto	Amelysis Date/Satch	Method	Dilution Pautor	ж	Onite	Remuit
Total Solids	08/26/02	EPA 160.3		0.01	Percent	33,4
total sorras	0825281	SM 2540 B		0.01		33,4
Total Organic Carbon	08/27/ <b>02</b> 08272#1	Plumb, 1981		0.0050	Percent	7.7

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in mothod blank above detection

Report for SN11 received 08/22/02



Laboratory analysis of Conventional Parameters

Sample No: 20090-21-88

Lab Sample ID: ER31E

QC Report No: ER31-Anchor Environmental

LIMS ID: 02-11412

Project: BARBER MILLS

Hatrix: Sediment

Whatcom Waterway Sediments

Data Release Authorized: 0.4

Date Sampled: 08/21/02 Date Received: 08/22/02

Reported: 08/25/02 Amy S. Phillips

	Annlysis		Dilution			
Analyte	Date/Batch	Method	Factor	KL.	Units	Remult
Total Solids	08/26/02 08262#1	EPA 160.3 SK 2540 B		0.01	Percent	60.0
Total Dryamit Carbon	08/27/02 0827241	Plumb, 1961		0.0050	Percent	4.1

RL Amelytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection

Report for ER31 received D8/22/D2



#### Laboratory Analysis of Conventional Parameters

Sample No: EMPD-22

Lab sample ID: EX78K LIMS ID: 02-16032 QC Report No: EX78-Anchor Environmental

Project: Barbse Mill

Matrix: Sediment

Date Sampled: 10/20/02

Data Release Authorized: 5M

Date Received: 10/29/02

Reported: 11/04/02

	Analysis		Dilution			
Azelyte	Date/Satch	Method	Factor	<u> </u>	Units	<u>kesult</u>
Total Solids	10/29/02 102 <b>92</b> #1	EPA 160.3 SK 2540 B		0.01	Percent	22.4
Total Organic Carbon	11/04/02 11042#1	Plumb. 1981		0.0050	Percent	7,3

FL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



## Leboratory Analysis of Conventional Parameters

Sample No: EMPD-23

Lab Sample ID: EX78L

QC Report No: EX78-Anchor Environmental

LIM9 ID: 02-16033

Project: Barbee Mill

Macrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized: [ ]

Date Received: 10/29/02

Reported: 11/04/02

	Analysis		Dilution			
<u>Analyca</u>	Date/Satch	Method	Factor	ЯĹ	Units	Result
Total Solids	19/29/02 10292#1	EPA 160.3 EM 2540 B		0.01	Percent	27.7
Total Organic Carbon	11/04/02 11042#1	Plumb, 1981		0.0050	Percent	5.6

RL Analytical reporting limit

Undetected at reported detection limit

B Analyte found in method black above detection



Laboratory Analysis of Conventional Parameters

Sample No. BMPD-02

Lab Sample ID: EXTAM

QC Report No: EX78-Anchor Environmental

LIMS ID: 02-16034

Project: Barbae Mill

Matrix: Sediment

Date Sampled: 10/28/02

Data Release Authorized: 🙌

Date Received: 10/29/02

Reported: 11/04/02

	Analysis		Dilution			
Analyte	Date/Batch	Mathad	Pactor	RL	Dnits	Result
Total Solids	10/29/02 10292#1	EPA 160.3 6M 2540 B		D. <b>D</b> 1	Percent	27.3
Total Organic Carbon	11/04/02 11042#1	Plumb.1981		D. <b>QO</b> SO	Percent	13

RL Analytical reporting limit

U Undetected at reported detection limit

B Analyte found in method blank above detection



#### GA Report - Mathod Blank Analysis

OC Report No: E231-Anchor Environmental

Project: BARRER MILLS

Whatcom Waterway Sediments

Date Received: NA

Data Release Authorized: 🚧

Macrix: Sediment

Reported: 08/29/02 Amy S. Phillips

#### METERN BLANK PROUTS CONVENTIONALS

Analysis Date & Butch	Constituent	Daite	Regult
Method Blank 08/26/02 08262#1	Total Solids	ng residue	< 0.01 U
Hethod Blank 08/27/02 0027261	Total Organic Carbon	Percent	40.0050 U



#### QA Report - Standard Enforceme Naturial Analysis

OC Report No: ER31-Amebor Environmental

Project: BARBER MILLS

Whatcom Waterway Sediments

Date Received: NA

Data Release Authorized: DAT

Reported: 08/29/02 Amy S. Phillips

## STANDARD REFERENCE HAPPERIAL ANALYSIS CONFUNCTIONALS

Constituent	Chica	yelua	True Value	Becovery
NIST 8704	_			
Total Carbon	Percent	J.49	0.35	93.34
Date analyzed: 08/27/02	Batch ID: 0827.	241		



### OA Report - Replicate Analysis

OC Report No: ER31-Anchor Environmental

Project: BARBEE MILLS

Whatcom Waterway Sediments

Date Received: 08/32/02

Data Release Authorizes: GAT

Matrix: Sediment

Reported: 08/29/02 Amy S. Phillips

## PEPLICATE AMALTSIS RESULTS CONVENTIONALS

Constituent	Units	Sampla Valup	Replicate Value(a)	R20/200
ARI ID: 02-11408, MM31 A	Client Sam	ple TD: 2007D-15-88		
Total Bolids	Percent	49.3	50.1	NPO: 1.64
Total Organic Carbon	Pércent	<b>5.5</b>	4.B 6.6	RSD: 16.14



#### Qa Report - Matrix Spike/Matrix Spike Duplicate Analysis

QC Report No: EP31-Anchor Environmental

Matrix: Sediment

Project: BARBEE NILLS

Whatcon Waterway Sediments

Date Received: 09/22/02

Data Release Authorized:

Reported: 08/29/02 Amy B. Phillips

#### MATRIX SPIKE QA/QC REPORT COMPART CHAIRS

<u>Constituent</u>	Saita	Sample Vulne	Spika Valne	Spike Added	Recovery
ARI 10: 02-11408, MM31 A	Client Sample II	H BIOD-15	- 65		
Total Organic Carbon	Percent	5.48	7.98	3.13	80.6%

MS/MSD Recovery Limits: 75 - 125 %



#### QA Report - Replicate Analysis

QC Report No: EX78-Anchor Environmental

Matrix: Sediment Project: Barbee Mill

Date Received: 10/29/02

Data Release Authorized: Auth

Reported: 11/04/02

#### REPLICATE AMALTSIS RESULTS CONVENTIONALS

Constituent	Doits	Sample Value	Replicate Value(s)	RPO/RSO
ARI ID: 02-16022, MI78 A	Client Samp	10 ID: BHPD-01		
Total Solids	Percent	36.7	37.6 38.5	RSD: 1.5%
Total Organic Carbon	Percent	6.3	6.1 6.3	RSD: 1.94



#### QA Report - Matrix Spike/Matrix Spike Duplicate Analysis

QC Report Ro: EX78-Anchor Environmental

Matrix: Sediment Project: Harbee Mill

Date Received: 10/29/02

Data Release Authorized: 🙌

Reported: 11/04/02

#### MATRIX SPIKE QA/QC REPORT COMMUNICIPALS

Constituent	Onits	Sample Value	Mpika Valuq	Spite Added	Recovery
ARI ID: 02-16022, RE76 A	Client Sample I	D: BMPD-01			
Total Organic Carbon	Percent	6.34	14.7	8.17	1024

MS/MSD Recovery Limics: 75 - 125 %



#### Ql Report - Standard Reference Material Analysis

QC Report No: EX78-Anchor Environmental

Project: Barbee Mill

Date Received: NA

Date Release Authorized:

Reported: 11/04/02

## STANDARD REFERENCE MATERIAL AMALYSIS CONVENTIONALS

			True	
Constituent	Unita	Value	Value	Recovery
MIST 8704				
Total Carbon	Percent	3.51	3.35	105%
Date analyzed: 11/04/02	Batch ID: 1100	12#1		